(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 873 031 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
21.10.1998 Bulletin 1998/43

(51) Int Cl.[6]: **H04Q 7/32**

(21) Application number: **98200776.7**

(22) Date of filing: **11.03.1998**

(84) Designated Contracting States:
AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **21.03.1997 NL 1005601**

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(54) Combination of a pager with a radiotelephone

(57) A telecommunication system (1) comprising a telecommunication network (2) and at least one terminal (3) is described. The terminal (3) comprises a radiotelephone section (4) and a pager section (5). The radiotelephone section (4) and the pager section (5) can be uncoupled from and coupled to each other. The telecommunication network (2) comprises paging means (20) for transmitting to the pager section (5) calls from callers who form part of a preferred group if the pager section (5) of the radiotelephone section (4) is uncoupled. The terminal (3) is provided with coupling detection means (51) for detecting whether the pager section (5) of the radiotelephone section (4) is uncoupled and, if this is the case, for transmitting an indication signal hereof to the paging means (20).

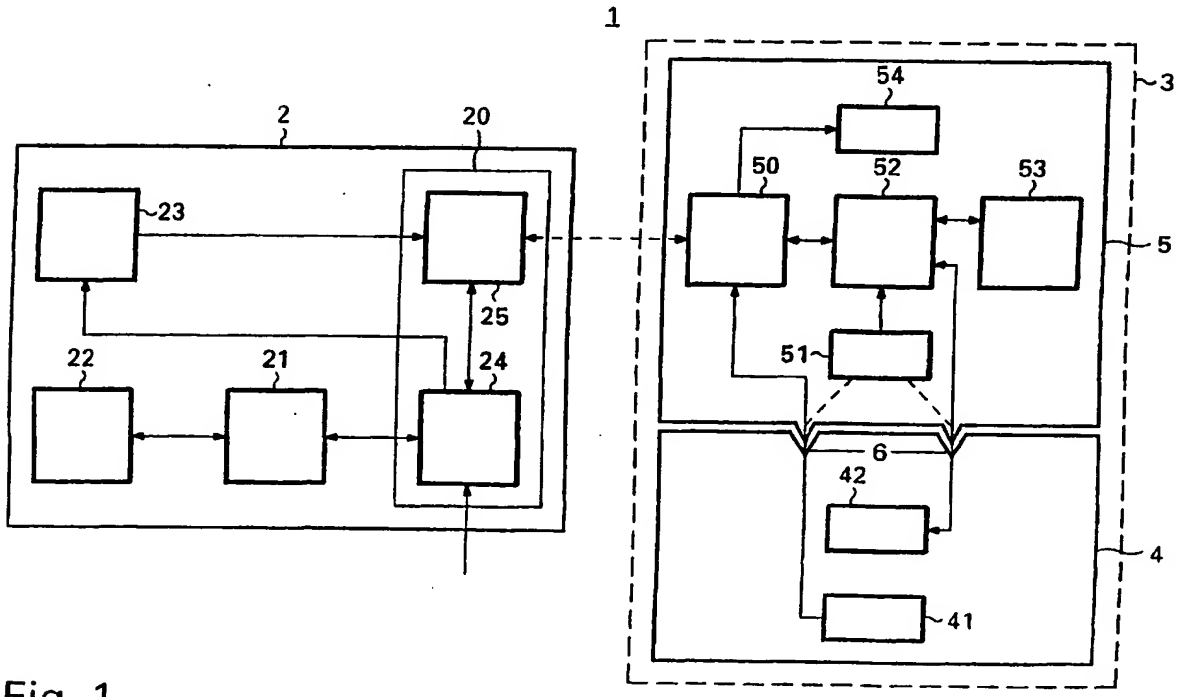

Fig. 1

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comparison means 21, a first memory 22 and a second memory 23 for storing messages. The paging means 20 consist of a control processor 24 and a transmitter/receiver 25. The transmitter/receiver 25 operates according to a standard for mobile telephony, for example GSM. The telecommunication network 2 is of the type in which, in the event of a call, the number of the caller is jointly transmitted (CLI=Caller Line Identification). The radiotelephone section 4 of said terminal 3 comprises a microphone 41 and a user interface 42. Said user interface 42 consists at least of a telephone keypad and can optionally also comprise a display. The pager section 5 comprises a transmitter/receiver 50, detection means 51, a control processor 52, a user interface 53 and a loudspeaker 54. The user interface 53 consists of a display for showing received messages and optionally a keypad. The detection means 51 detect whether the pager section 5 and the radiotelephone section 4 are uncoupled or coupled. The transmitter/receiver 50 operates according to a standard for mobile telephony, for example GSM.

The telecommunication system 1 shown in FIG. 1 operates as follows: As soon as the user uncouples the radiotelephone section 4 and the pager section 5 from each other, this is detected by the detection means 51. Via the control processor 52 and the transmitter/receiver 50, the detection means 51 transmit an indication signal, indicating that the pager section 5 and the radiotelephone section 4 are uncoupled from each other, to the telecommunication network 2. This signal is received by the transmitter/receiver 25 and passed on to the control processor 24 for processing. If an indication signal of the detection means 51 is received, the control processor 24 issues the state "uncoupled" to the terminal 3. In the state "uncoupled", callers from a preferred group can transmit a call to the user of said terminal 3. The comparison means 21 determine whether a caller who attempts to contact said terminal 3 belongs to the preferred group by comparing the telephone number of the caller with the telephone numbers of the preferred group stored in the first memory 22, or by comparing a secret code entered by the caller with a code stored in the first memory 22. If the caller belongs to the preferred group, a call is sent by the paging means 25 to the pager section 5. This call optionally comprises a short message from the caller which can be shown via the display which is present on the pager section 5. Other callers are given the opportunity to leave a message, which is stored in said second memory 23. The message can be in the form of voice (voice mail) or text. The user is notified of the existence of the message as soon as he reconnects the pager section 5 and the radiotelephone section 4 to each other. He can then listen to the message or read it out.

As soon as the pager section 5 and the radiotelephone section 4 are coupled to each other again by the user, the detection means pass an indication signal for this situation on to the control processor 24. The control processor 24 then issues the state "coupled" to said terminal 3. Within said state "attached", three sub-states can be set by the user. These are:

- Fully reachable: the user can be reached directly by callers from the preferred group as well as by other callers;
- Partially reachable: the user is only directly reachable for callers from the preferred group; other callers are given the opportunity of leaving a message, which is stored in said second memory 23. The message can be in the form of voice (voice mail) or text.
- Blocked: the user is not directly reachable for any caller at all. Both the callers from the preferred group and the other callers are given the opportunity of leaving a message, which is stored in said second memory 23. The message can be in the form of voice (voice mail) or text.

The caller can set all said sub-states via the user interface 42 which is present in the radiotelephone section 4.

By means of the loudspeaker 54 which is present in the pager section 5, and the microphone 41 which is present in the radiotelephone section 4, the user is able to conduct telephone calls during the state "coupled". The radiotelephone section 4 itself is not provided with a transmitter/receiver and a control processor. Said two components are located in the pager section and, if the pager section 5 and the radiotelephone section 4 are coupled to each other, are also used by the radiotelephone section 4. In this way it is not necessary to provide said terminal 3 with two control processors and transmitter/receivers. To this end, the mechanical coupling 6 must also result in electrical contact between the radiotelephone section 4 and the pager section 5. The transmitter/receiver 25, present in the telecommunication network 2, is also suitable for transmitting and receiving the signals associated with telephone calls conducted with terminal 3.

By means of the user interface 42, the user can also set the telephone numbers which are to be incorporated in the preferred group. These telephone numbers are transmitted to the telecommunication network 2 and stored in storage means 22. An alternative solution is storing a secret code in said storage means 22. The user of said terminal 3 passes this secret code on to the callers from his preferred group. These callers must then indicate, by entering the secret code, that they belong to the preferred group.

Said control processor 24 is loaded with software for executing the steps of the flow charts shown in the FIG. 4A and FIG. 4B. The steps shown in FIG. 4A have the following meaning:

STEP	MEANING
100	START
110	STATE IS "UNCOUPLED"?'
120	CALLER BELONGS TO PREFERRED GROUP?
130	CONNECT CALLER TO SECOND MEMORY
140	STORE MESSAGE
150	CALLER CAN LEAVE MESSAGE
160	TRANSMIT MESSAGE TO PAGER SECTION
170	STATE IS "PARTIALLY REACHABLE"?
180	CALLER BELONGS TO PREFERRED GROUP?
190	ESTABLISH CONNECTION WITH TERMINAL
192	ANSWER?
194	DIRECT CONNECTION
196	CONNECT CALLER TO SECOND MEMORY
197	STORE MESSAGE
198	TRANSMIT NOTIFICATION MESSAGE TO TERMINAL
200	CONNECT CALLER TO SECOND MEMORY
210	STORE MESSAGE
215	TRANSMIT NOTIFICATION MESSAGE TO TERMINAL
220	STATE IS "BLOCKED"?
230	ESTABLISH CONNECTION WITH TERMINAL
232	ANSWER?
234	DIRECT CONNECTION
236	CONNECT CALLER TO SECOND MEMORY
237	STORE MESSAGE
238	TRANSMIT NOTIFICATION MESSAGE TO TERMINAL
240	CONNECT CALLER TO SECOND MEMORY
250	STORE MESSAGE
255	TRANSMIT NOTIFICATION MESSAGE TO TERMINAL
260	STOP

If someone calls terminal 3, it is first determined in step 110 whether the state of terminal 3 is "coupled" of "uncoupled". If the state is "uncoupled", it is determined in step 120 whether the caller belongs to the preferred group. This can be done by the comparison means 21 comparing the telephone number of the caller with the telephone numbers stored by the storage means 22, or by said comparison means comparing a secret code, entered by the caller, with a stored code. If the caller does not belong to the preferred group, the caller is switched through, in step 130, with the second memory 23 and is requested, for example by means of a voice message, to record (voice mail) or type a message. In step 140, this message is stored. As soon as the state of terminal 3 is "coupled" again, a notification message is sent to terminal 3 indicating that there is a message for the user. This is shown in FIG. 4B. The steps shown herein have the following meaning:

300	START
310	PAGER SECTION IS COUPLED TO RADIOTELEPHONE SECTION
320	STORED MESSAGES?
330	TRANSMIT NOTIFICATION MESSAGE TO TERMINAL
340	STOP

As soon as the pager section 5 is recoupled to the radiotelephone section 5, the detection means 51 transmit a message to this extent to the control processor 24 (step 310). It is subsequently determined whether, during the state "uncoupled", messages for the user were left by callers not belonging to the preferred group (step 320). If this is the case, a notification message is transmitted to said terminal 3 (step 330). The use can then listen to or read out the message in the way known per se.

If the caller does belong to the preferred group, the caller is requested in step 150, for example again by means of a voice message, to leave a message. In step 160, this message is transmitted to the pager section 5. Said pager section 5 comprises a loudspeaker 54 suitable for reproducing a ringing or beeping sound to draw the attention of the user to the message which has arrived, and a display for displaying this message. If the state of terminal 3 is "coupled", it is determined in step 170 whether the state is "partially reachable". If this is so, it is determined in step 180 whether the caller belongs to the preferred group. If the caller belongs to the preferred group, a direct telephone connection with terminal 3 is established in step 190. In step 192 it is determined whether the user of said terminal 3 answers within a certain period. If this is so, there is a direct connection between the caller and said terminal 3 (step 194). If the user does not answer, the caller is switched through, in step 196, to the second memory 23 and is requested to record or type a message. In step 197, this message is stored. In step 198 a notification message is sent to terminal 3, indicating that there is a message. If the caller does not belong to the preferred group, the caller is switched through, in step 200, to the second memory 23 and is requested to record or type a message. In step 210, this message is stored. In step 215, a notification message is sent to terminal 3, indicating that there is a message. The user can listen to or read out this message in the way known per se. If the state of terminal 3 is not "partially reachable", it is determined, in step 220, whether the state is "blocked". If this is not the case, the state of terminal 3 is "fully reachable". In this case, in step 230, regardless of whether the caller belongs to the preferred group or not, a direct connection with terminal 3 is established. In step 232 it is determined whether the user of said terminal 3 answers within a certain period. If this is so, a direct connection is established between the caller and said terminal 3 (step 234). If the user does not answer, the caller, in step 236, is switched through to the second memory 23 and is requested to record or type a message. In step 237, this message is stored. In step 238, a notification message is sent to terminal 3 indicating that there is a message. If the state is indeed "blocked", the caller, regardless of whether he or she belongs to the preferred group, is switched through, in step 240, to said second memory 23 and is requested to record or type a message. In step 250, this message is stored. In step 255, a notification message is sent to terminal 3, indicating that there is a message. The notification message indicating that there is message, is preferably sent in the way this is done in already existing GSM systems. The message, which is passed on to the pager section 5 if the state is "uncoupled" and the caller belongs to the preferred group, is, for example, sent in the same way as SMS (Short Message Service) messages in already existing GSM systems.

In FIG. 2, a second form of embodiment of the telecommunication system 1 is shown. In this form of embodiment, the first memory 21 and the comparison means 22 are not accommodated in the telecommunication network 2 but in the pager section 5 of the terminal 3. As soon as a caller attempts to reach terminal 3 in the state "uncoupled", the telephone number of the caller is first sent to said terminal 3 by the paging means 20. This telephone number is compared by the comparison means 21 with the telephone numbers stored in said first memory 22. If the telephone number of the caller is the same as one of the stored telephone numbers and the caller therefore belongs to the preferred group, or if the secret code entered by the caller corresponds to the stored code, the comparison means 21, via control processor 52 and transmitter/receiver 50, transmit a confirmation signal to the paging means 20 of the terminal, said paging means subsequently transmitting a call from the caller to the pager section 5. If the caller does not belong to the preferred group, the comparison means 21 transmit a message to this extent back to the paging means 20. These, of course, do not then transmit a call to the pager section 5, so that the user is not disturbed. During the state "coupled", combined with the sub-status "partially reachable", a similar procedure is performed.

In FIG. 3, a third form of embodiment of the telecommunication system 1 according to the invention is shown. In this form of embodiment, the telecommunication network 2 comprises a transmitter 25' suitable for transmitting calls according to a paging standard, and a transmitter/receiver 26 which operates according to a standard for mobile telephony. The pager section 5 comprises a receiver 50' for receiving paging calls. The radiotelephone section 4 comprises a loudspeaker 40, a transmitter/receiver 43 suitable for a mobile telephony standard, and a control processor 44. The detection means 51 are also located in the radiotelephone section 4.

In the state "uncoupled", the calls originating from callers of the preferred group are transmitted by said transmitter 25' to the pager section 5, which receives the calls by means of receiver 50'. During the state "coupled", telephone conversations can be conducted with said radiotelephone section 4. To this end, use is made of transmitter/receiver 43 and transmitter/receiver 26 which operate according to a standard for mobile telephony. The detection means 51 transmit the indication messages of the state of said terminal 3 to the telecommunication network 2 by means of transmitter/receiver 43.

The telecommunication system 1 according to this form of embodiment has the advantage that the pager section 5 uses very little energy during the state "uncoupled". The reason for this is that, in paging systems, messages are sent only from the network to the terminal, and not vice versa. In this form of embodiment, the pager section 5 therefore does not lose any energy in transmitting registration messages, as is the case in the two forms of embodiment in which the pager section operates according to a standard for mobile telephony as shown in FIG. 1 and 2.

In the first and the second form of embodiment as shown in FIG. 1 and FIG. 2, the radiotelephone section 4 has been kept as simple as possible, all logic, including the so-called "SIM" card, if the terminal operates according to the

GSM standard, being located in the pager section 5. In the third form of embodiment, as shown in FIG. 3, both the radiotelephone section 4 and the pager section 5 contain the logic required for the functioning of these respective parts.

It will be clear to those skilled in the art that the invention is not restricted to the forms of embodiment shown, and that many modifications and extensions are possible without departing from the scope of the invention. The telecommunication system can, for example, be suitable for operation according to a mobile telecommunication standard other than GSM.

Claims

1. Telecommunication system (1) comprising a telecommunication network (2) and a terminal (3), said terminal (3) comprising a radiotelephone section (4) and a pager section (5), in which the pager section (5) of the radiotelephone section (4) can be uncoupled, **characterised in that** the telecommunication network (2) comprises paging means (20) for transmitting to the pager section (5) calls from callers who form part of a preferred group if the pager section (5) of the radiotelephone section (4) is uncoupled, and that said terminal (3) is provided with coupling detection means (51) for detecting whether the pager section (5) of the radiotelephone section (4) is uncoupled and, if this is the case, for transmitting an indication signal hereof to the paging means (20).

2. Telecommunication system (1) according to Claim 1, **characterised in that** the telecommunication network (2) is provided with message storage means (23) for storing messages from callers who do not form part of the preferred group if the pager section (5) is uncoupled from the radiotelephone section (4).

3. Telecommunication system (1) according to Claim 1 or 2, **characterised in that** the paging means (20) are arranged for transmitting said calls via a radio channel for mobile telecommunication.

4. Telecommunication system (1) according to Claim 1 or 2, **characterised in that** the paging means (20) are arranged for transmitting the calls via a radio channel for paging.

5. Telecommunication system (1) according to any of the claims 1 to 4 inclusive, **characterised in that** the telecommunication network (2) comprises storage means (22) for storing the telephone numbers of callers who form part of the preferred group, and comparison means (21) for comparing the telephone number of a caller with the stored telephone numbers, in which the comparison means (21) are arranged for emitting a confirmation signal to the paging means (20) if the telephone numbers correspond.

6. Telecommunication system (1) according to any of the claims 1 to 4 inclusive, **characterised in that** the terminal (3) comprises storage means (22) for storing telephone numbers of callers who form part of the preferred group, and comparison means (21) for comparing the telephone number of a caller with the stored telephone numbers, in which the comparison means (21) are arranged for emitting a confirmation signal to the paging means (20) if the telephone numbers correspond.

7. Telecommunication system (1) according to any of the claims 1-4, **characterised in that** the telecommunication network (2) comprises storage means (22) for storing a code, and comparison means (21) for comparing a code, entered by a caller, with the stored code, in which the comparison means (21) are arranged for emitting a confirmation signal to the paging means (20) if the codes correspond.

8. Telecommunication system (1) according to any of the claims 1-4, **characterised in that** the terminal (3) comprises storage means (22) for storing a code, and comparison means (21) for comparing a code, entered by a caller, with the stored code, in which the comparison means (21) are arranged for emitting a confirmation signal to the paging means (20) if the codes correspond.

9. Terminal (3) for use in a telecommunication system (1), comprising a telecommunication network (2) and at least one terminal (3), the terminal (3) comprising a radiotelephone section (4) and a pager section (5), in which the pager section (5) of the radiotelephone section (4) can be uncoupled, **characterised in that** the terminal (3) is provided with coupling detection means (51) for detecting whether the pager section (5) of the radiotelephone section (4) is uncoupled and, if this is the case, for transmitting an indication signal hereof to the telecommunication network (2).

10. Telecommunication network (2) for use in a telecommunication system (1), comprising a telecommunication net-

work (2) and at least one terminal (3), said terminal (3) comprising a radiotelephone section (4) and a pager section (5), in which the pager section (5) of the radiotelephone section (4) can be uncoupled, **characterised in that** the telecommunication network (2) comprises paging means (20) for transmitting calls from callers who form part of a preferred group to the pager section (5) if the pager section (5) of the radiotelephone section (4) is uncoupled.

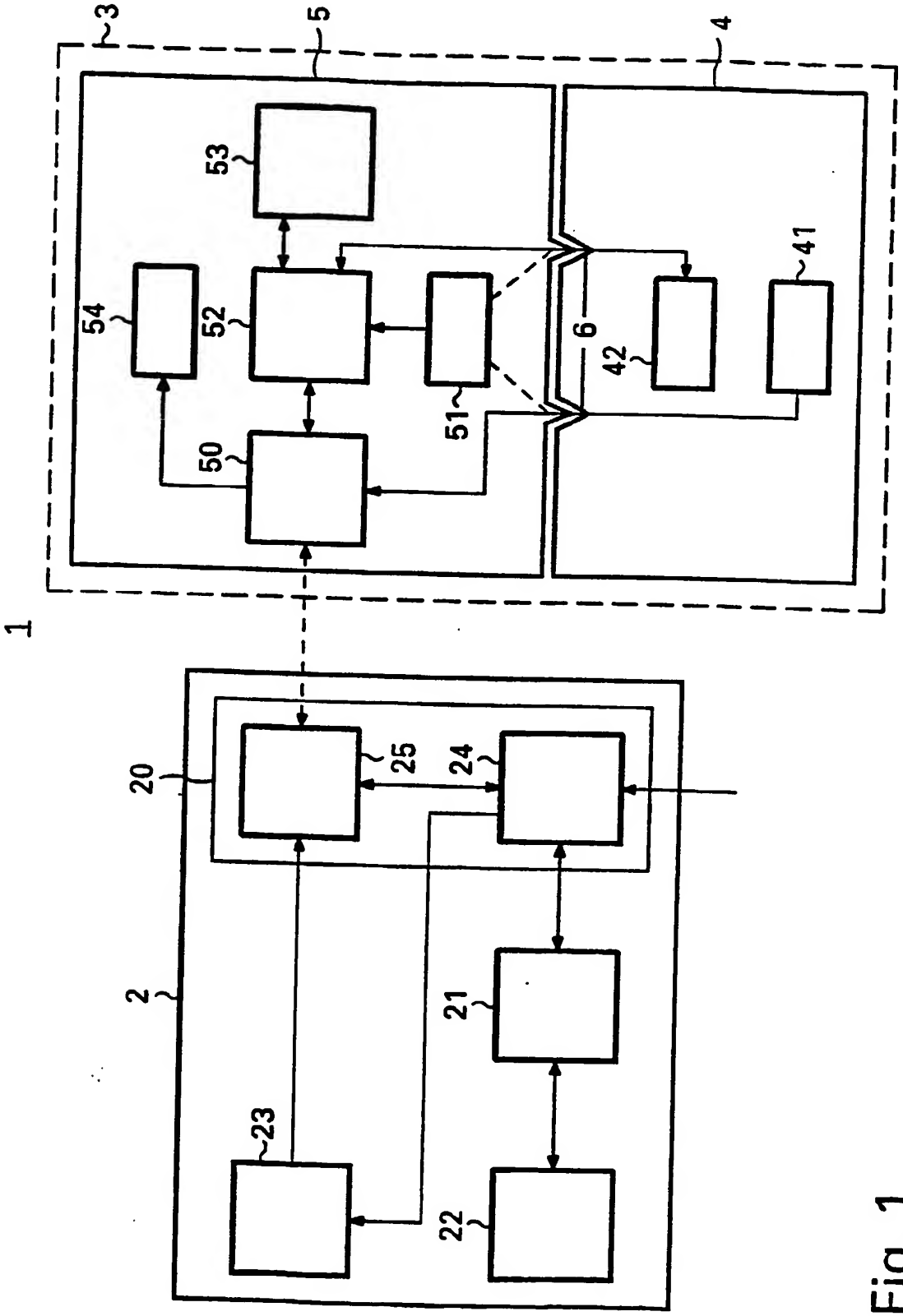

Fig. 1

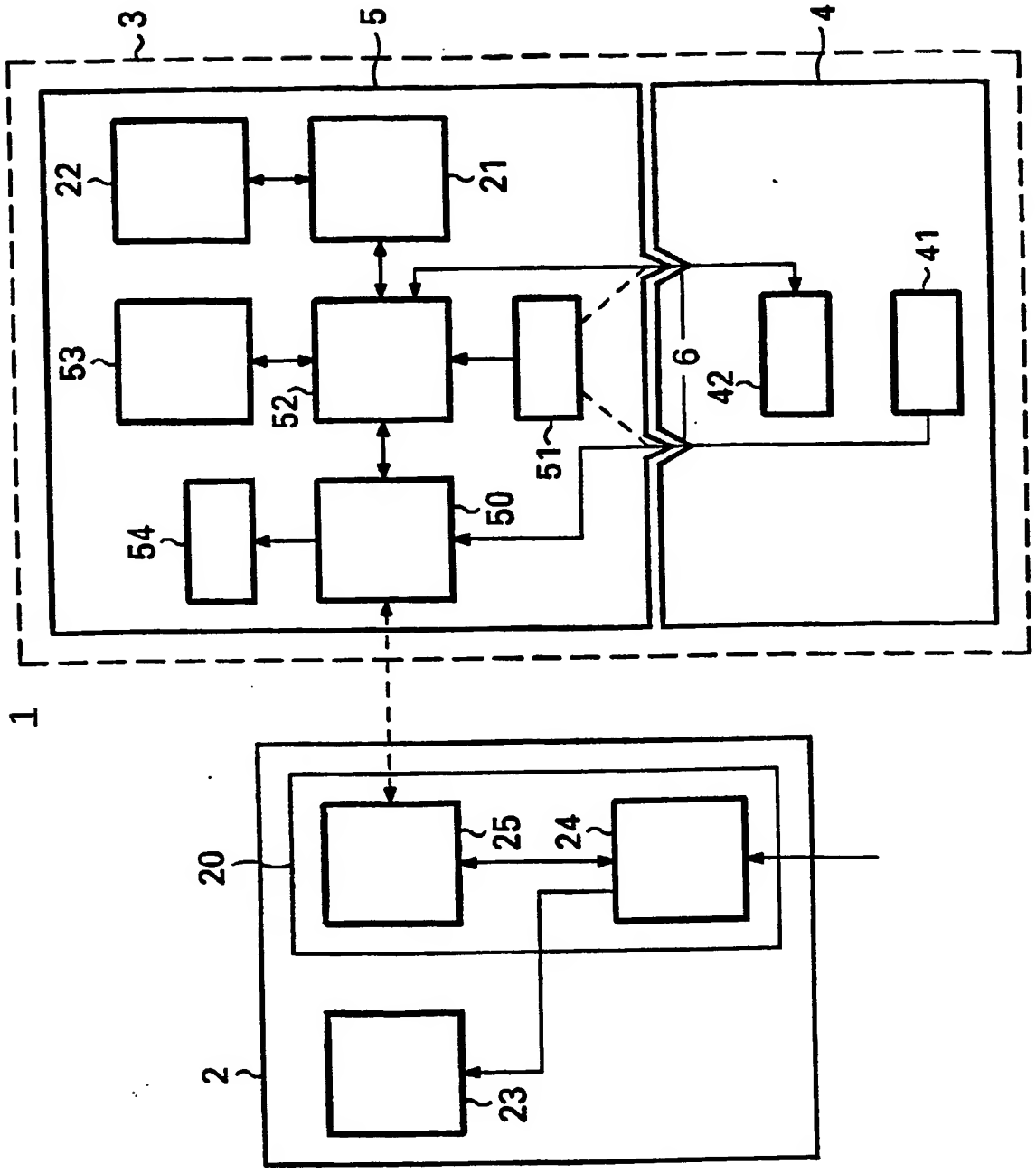

Fig. 2

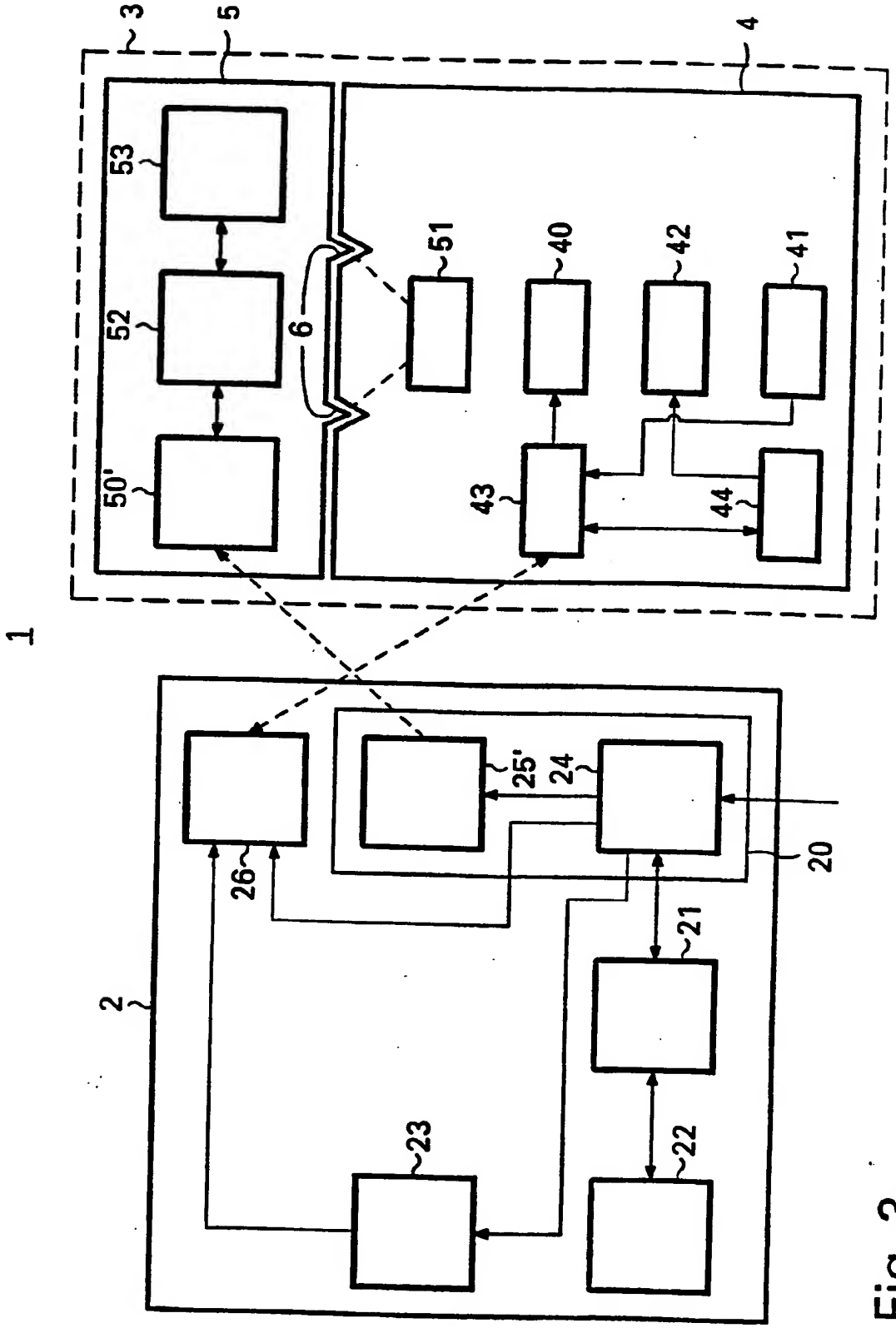

Fig. 3

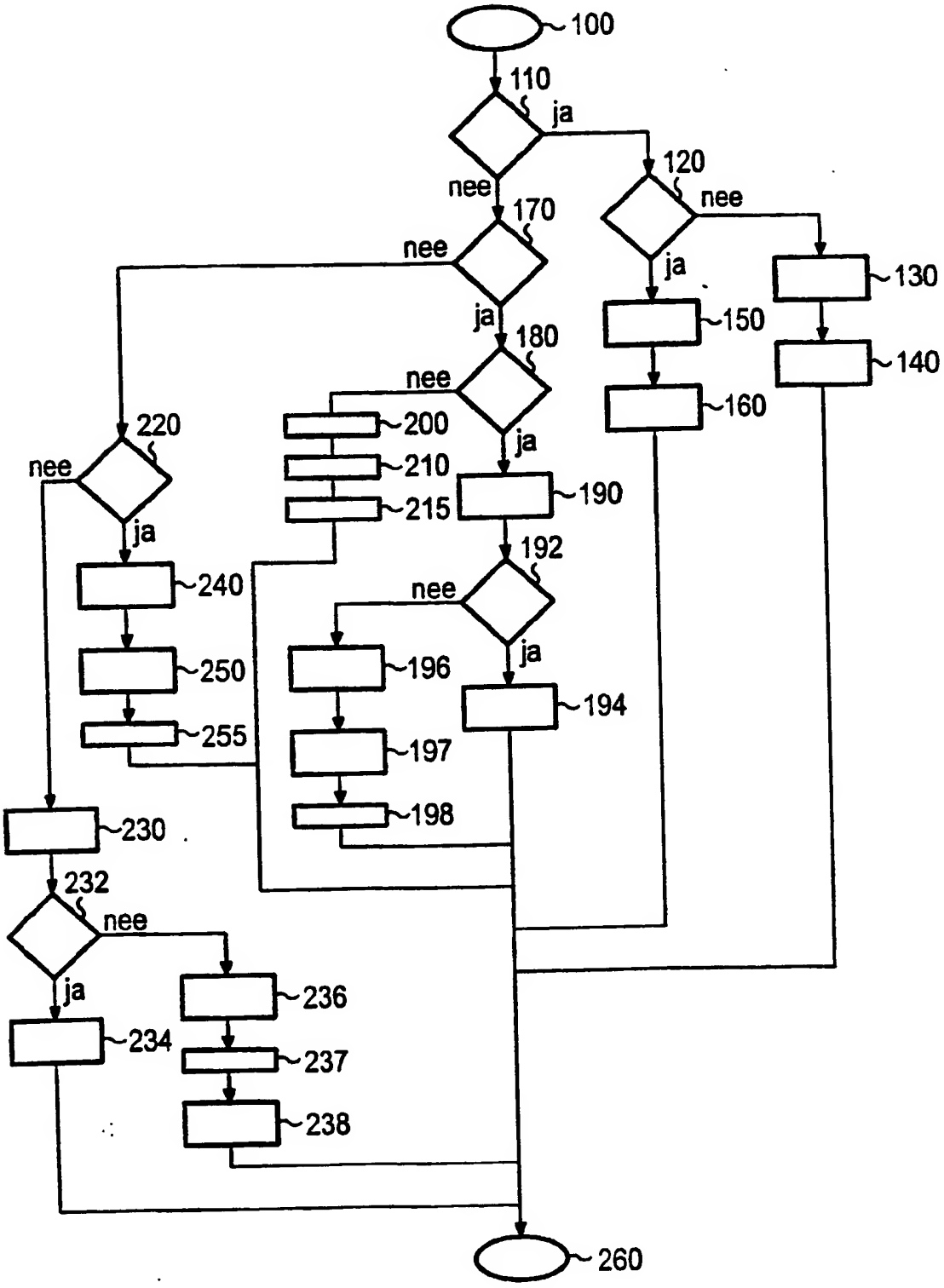
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Fig. 4A

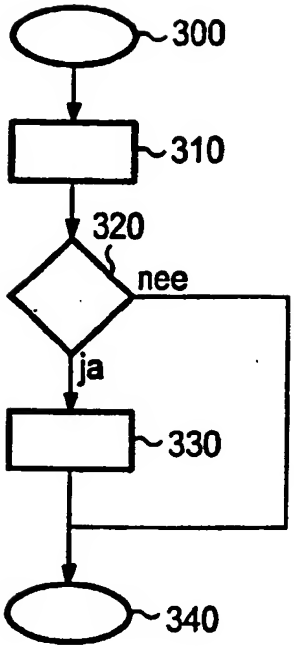

Fig. 4B

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EUROPEAN SEARCH REPORT

Application Number
EP 98 20 0776

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y	EP 0 503 813 A (AMERICAN TELEPHONE & TELEGRAPH) 16 September 1992 * column 3, line 11 - line 18 * * column 5, line 47 - column 6, line 11 * * column 9, line 21 - line 26 * * abstract; claims 2,4-7,9; figures 1,2 *	1-4,6,9, 10	H04Q7/32
Y	EP 0 514 360 A (ERICSSON TELEFON AB L M) 19 November 1992 * column 4, line 24 - line 28 * * column 5, line 50 - column 6, line 35 * * column 8, line 4 - line 17 * * column 8, line 36 - line 42 * * column 8, line 55 - column 9, line 9 * * abstract; figures 1,3 *	1-4,6,9, 10	
A	EP 0 319 210 A (TOKYO SHIBAURA ELECTRIC CO) 7 June 1989 * column 2, line 21 - line 38 * * abstract *	6,8	TECHNICAL FIELDS SEARCHED (Int.Cl.6)
A	US 5 511 111 A (SERBETCIOGLU BEKIR ET AL) 23 April 1996 * column 4, line 17 - line 61 * * abstract *	5,7	H04Q

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	3 July 1998	Coppieters, S

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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